2006 progress report

strategies ideas achievements

City of Boulder
Office of Environmental Affairs
Climate and Energy Programs
Progress Report - 2006

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Prepared by:

Kevin Afflerbaugh

Carolyn Brouillard

Yael Gichon

Sarah Van Pelt

Elizabeth Vasatka

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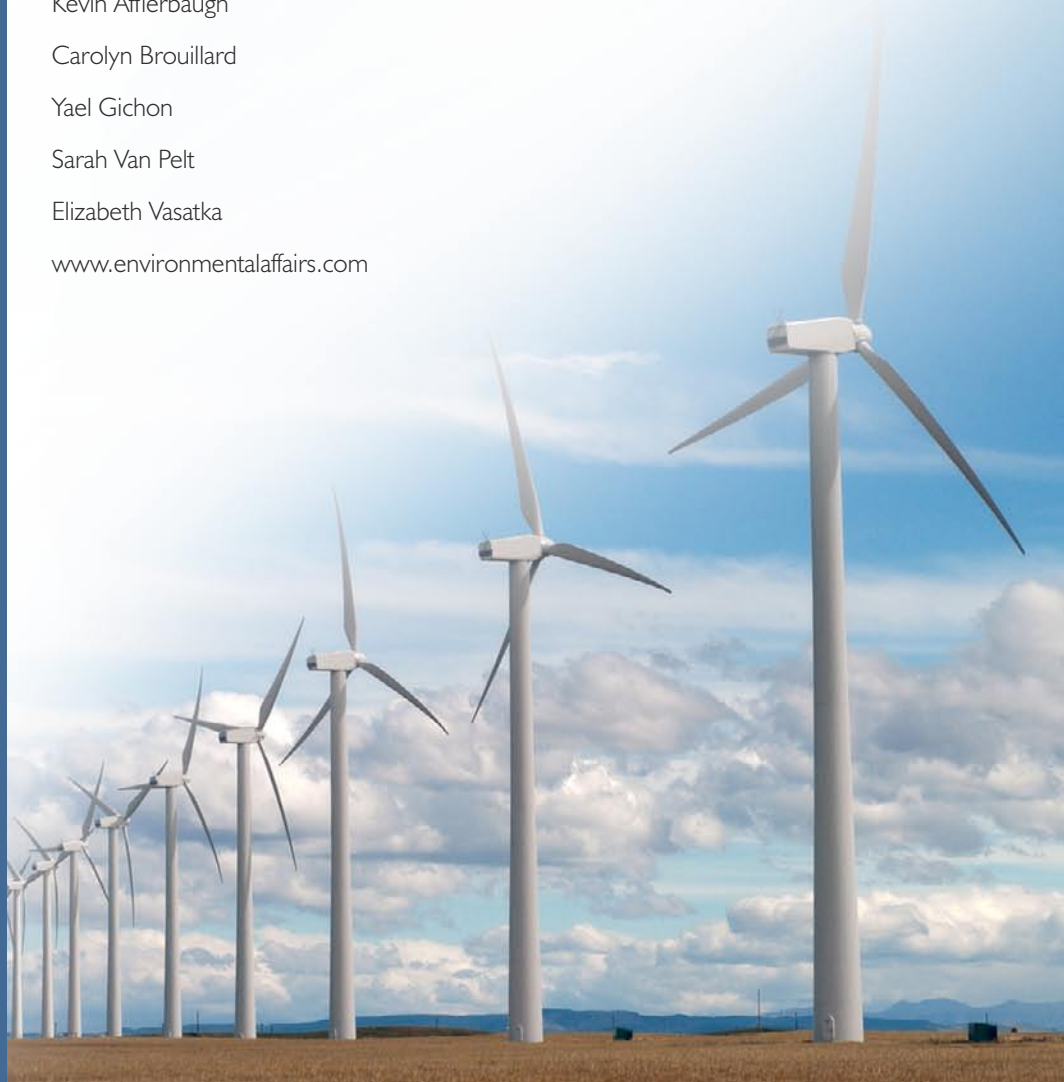

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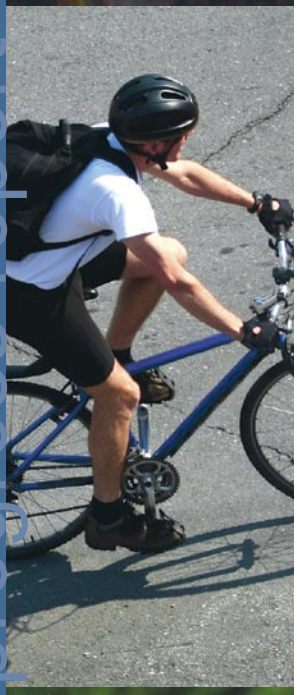

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OVERVIEW

2006 was a landmark year for the city of Boulder's efforts to reduce greenhouse gas (GHG) emissions. Years of effort by the city to reduce GHG emissions and improve energy efficiency culminated with two major events. First, after two years of work by city staff, City Council, and the community, the Climate Action Plan (CAP) was adopted by the City Council in June. The CAP is a working template that outlines programs that will guide the city's efforts to reduce GHG emissions with an initial goal of meeting the Kyoto Protocol target in 2012.

Secondly, Boulder became the first municipality in the nation to tax energy use as a method to fund GHG emissions reduction strategies. This tax was approved by 60% of voters in November and will be used to fund the efforts described in the CAP. Passage of this tax garnered worldwide attention as communities around the world search for methods to combat climate change.

Boulder experienced the third consecutive year of GHG emissions reduction. The decline from 2004 to 2005 was slightly less than one percent and occurred despite an increase in electricity consumption. Factors that countered the increase in electricity use included reduced natural gas use, fewer vehicle miles traveled, and an increase in the use of renewable energy in the transportation and electricity sector.

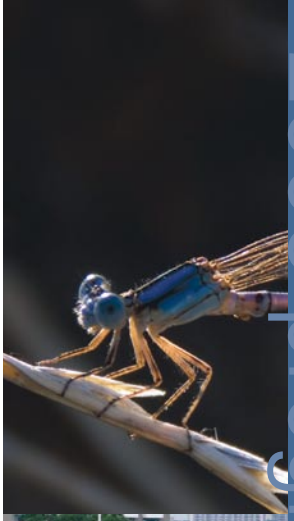
Overall, 2006 saw the continuation of many existing programs as well as the implementation of several new ones. Highlights from the year include:

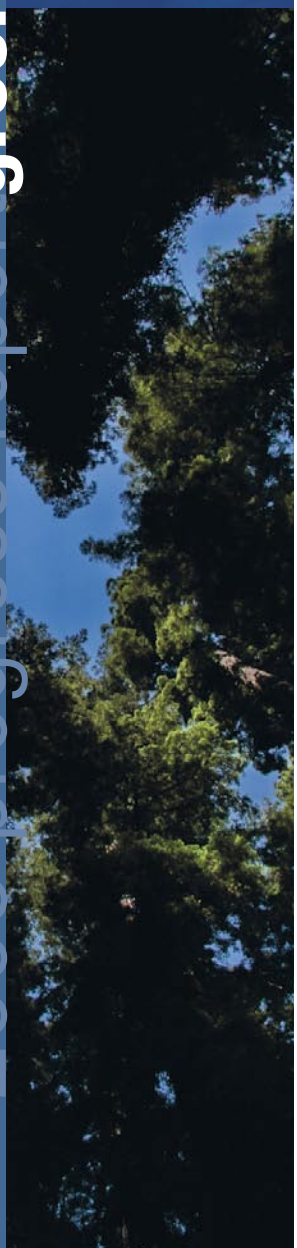
- City Council adopted the Climate Action Plan, which will guide the city's greenhouse gas reduction efforts through 2012;
- Received voter approval of city-wide carbon tax to fund implementation of the Climate Action Plan;
- Completed energy assessments at 15 businesses as part of the "Building Performance with ENERGY STAR" Program;
- Established a residential home energy audit program, serving 35 homes;
- Expanded residential weatherization services, serving 10 homes;
- Distributed over 1,500 energy-efficient compact fluorescent lights (CFL) and educational material;
- Initiated the second annual Boulder Wind Challenge with Boulder County and Western Resource Advocates, resulting in over 400 new wind power subscribers in Boulder County for over 2,000,000 kWh/year of wind energy;
- Launched two new programs targeting lower income households and multi-family housing;
- Reduced emissions from city operations in excess of Chicago Climate Exchange requirements;
- Formed the Climate Action Plan Committee, comprised of local stakeholders to provide input on the Plan and long term funding sources; and
- Expanded outreach and education efforts in the community.

CLIMATE ACTION PLAN

City Council approved the Climate Action Plan in June 2006. This culminated years of effort by staff, Council, and the community to develop a plan to combat climate change through GHG emissions reductions. The CAP outlines baseline information, including the emissions inventory, and establishes the context for the GHG work. It also presents emissions reduction strategies for each sector. The primary strategies for reaching the emission reduction goal are to increase energy efficiency, shift to renewable fuel sources for electricity and vehicle fuel, and reduce vehicle miles traveled. The specific strategies are based on programs and policies in other communities, utility energy efficiency programs, staff research, and input from the Climate Action Plan Committee and City Council. The CAP is continuously evolving in response to new information, legislation and opportunities.

Section VI of the CAP—The Implementation Plan—outlines the specific programs and actions that are proposed for 2007 to 2012, with service levels and programmatic details subject to change in response to new circumstances and as targets are achieved. This section reflects participation rates and results that are believed to be reasonable, achievable and conservative, so as not to overestimate results or underestimate the necessary budget. The CAP can be viewed at www.environmentalaffairs.com.

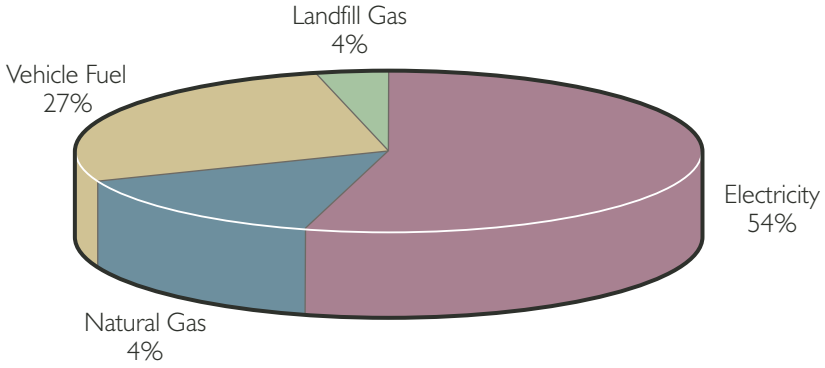




THE GREENHOUSE GAS INVENTORY

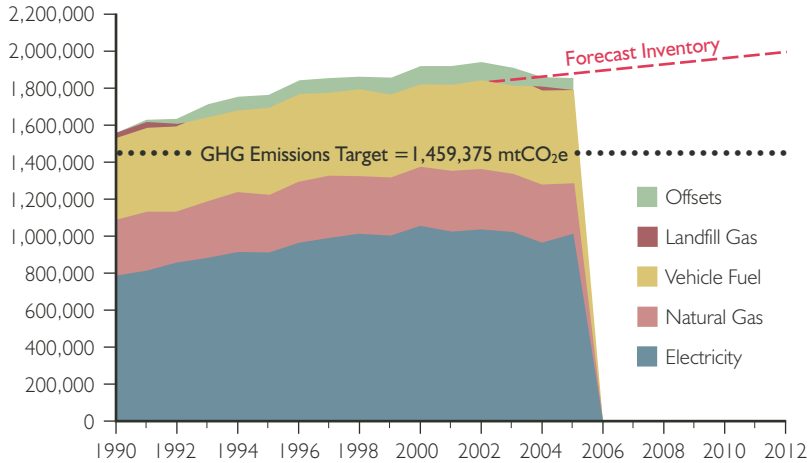
The GHG emissions inventory was updated to reflect 2005 data using the Inventory Maintenance System developed for the city by Econergy. The primary data sources are community electricity and natural gas consumption from Xcel Energy, University of Colorado operations and generation, annual vehicle miles traveled from the city's Transportation Division, tons of garbage sent to the landfill, and offsets from the purchase of renewable energy, such as wind power and biodiesel. The system translates these inputs into GHG emissions by sector and by fuel source. The pie-chart below shows the GHG emissions by source:

GHG INVENTORY BREAKDOWN BY ENERGY SOURCE



The 2005 inventory shows a very slight (<1% decline) in emissions from 2004 levels. Relative to 2002, which had the highest emissions level since 1990, Boulder's emissions have reduced by 3%. The following graph depicts the current trends of Boulder's GHG emissions based on energy source. It is important to note that the offsets depicted in yellow actually decrease Boulder's emissions. They are shown at the top of this graph for demonstrative purposes.

ACTUAL INVENTORY BY ENERGY SOURCE

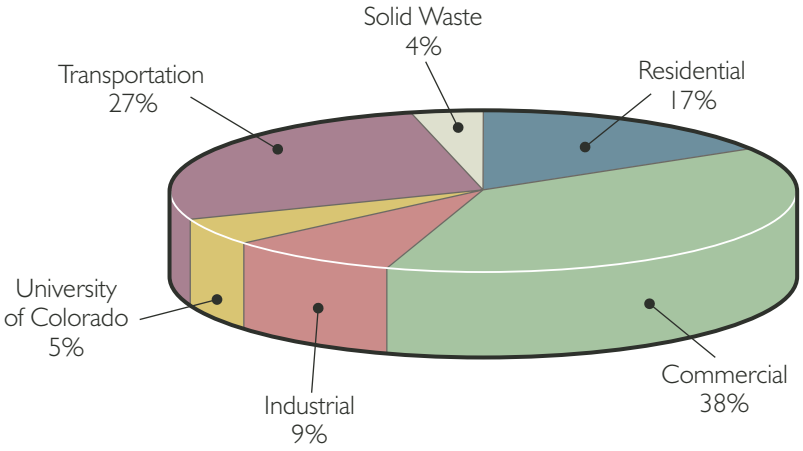


According to Xcel Energy's 2005 annual report to Boulder, total electricity consumption increased by 7.25% in 2005. It is interesting to note that from 2002 to 2003, total electricity consumption was relatively flat and then decreased by 5.4% from 2003 to 2004. Possible, but not proven, reasons for the increase are increases in air conditioning from additional systems and longer use, increases in plug loads, and population growth. The 2005 increase in electricity use was countered by reductions in natural gas use, fewer vehicle miles traveled, and increased use of renewable energy in transportation and electric sectors. For example, voluntary purchases of ethanol and biodiesel by the city fleet, other fleets and

residents increased by approximately 30% from 2004 to 2005. The State of Colorado also increased the percentage of ethanol in gasoline from 7% to 10%.

The community must reduce annual GHG emissions by 333,325 metric tons from 2005 levels by 2012 in order to meet the goals of the CAP. This represents a 19% decrease from 2005 levels. Commercial buildings continue to be the largest source of emissions at 38% of the total. This share is likely to increase with the opening of the 29th Street Mall and other new developments. The chart below shows the 2005 emissions breakdown by sector.

GHG INVENTORY BREAKDOWN BY SECTOR



BUDGET

2006 was an important year in developing a budget that will allow the city to both adequately staff and fund the GHG emission reduction efforts. Collaborations between staff, City Council, and the community helped develop this budget plan. The Office of Environmental Affairs (OEA), a division of the City Manager's Office, is responsible for the budget and implementation of CAP recommendations.

FUNDING

As part of the 2005 budget process, City Council approved a two-year increase to the Trash Tax, allocating $258,000 a year for 2005 and 2006 to fund GHG and energy programs. As this tax was expiring at the end of the 2006, Council directed staff to concentrate on developing and implementing long-term funding sources and offering limited commercial and residential programs that would begin to lower GHG emissions and raise public awareness about energy issues.

Throughout the first and second quarter of 2006, staff reviewed and discussed funding options with the newly-formed Climate Action Plan Committee (CAPC), City Council, and other groups. During discussions with the CAPC, members introduced a funding proposal that involved a charge based on the amount of fossil fuel energy consumed, which became the foundation of the carbon tax. The carbon charge option was favored due to the strong nexus to the work being funded and the limitations of the other possible funding options. Preliminary conversations with Xcel Energy proved promising, prompting staff to aggressively pursue the option. There was considerable discussion among the CAPC about whether the charge should be a fee or a tax. A voter-approved tax was selected by the CAPC, City Council, and staff because of potential legal difficulties associated with a fee and the desire to have clear public support.

On November 7, 2006, Boulder voters approved Initiative 202, the CAP Tax, marking the first time in the nation that a municipal government will impose an energy tax on its residents to directly combat global climate change. The tax will be collected by Xcel Energy based on the amount of fossil fuel based electricity used. Customers purchasing power through Xcel's Windsource program will not be charged. To keep administration costs low and the tax simple, only electricity consumption is taxed.

The tax will generate about $1 million annually through 2012 when the tax is set to expire. The City Council set the first year tax at a maximum rate of $0.0022 per kWh for residential customers; $0.0004 per kWh for commercial customers; $0.0002 per kWh for industrial customers. These amounts are based upon the first year Climate Action Plan implementation costs of $860,265 and are designed to reflect projected program and service expenditures by which 58% will go to the residential sector; 39% to the commercial sector; and 3% to the industrial sector in the first year. The average household will pay $1.33 per month and an average business will pay $3.80 per month.

In subsequent years, the City Council will have the authority to increase the rates as needed to fund the CAP to a maximum rate of $0.0049 per kWh for residential customers; $0.0009 per kWh for commercial customers; $0.0003 per kWh for industrial customers. These maximum tax rates are estimated to support a maximum $1,342,000 program budget.

STAFFING

Over the years, budgeting and staffing levels for climate programs have varied. In 2006, OEA had one full time and one fixed term employee working on GHG programs. Beginning in 2007, four staff will work on the CAP in four different areas of focus: the commercial and industrial sectors, the residential sector, the transportation sector, and marketing/outreach.

PROGRAMS

Discussions with the CAPC suggested that the city should act as a facilitator to connect residents and businesses with existing resources, develop and implement policies and programs that fill important gaps, and provide information to help the community make smart energy choices. Wherever possible, the city promotes existing external resources, such as Xcel Energy's energy efficiency and solar rebates and state weatherization funds. This approach is in contrast to providing direct financing or directly implementing efficiency measures in private buildings. The city's intent is to encourage and facilitate private sector investment in actions to reduce emissions.

Many of the programs initiated in 2004 and 2005 were continued in 2006. In accordance with City Council direction, staff's efforts in 2005 were focused predominantly on limited commercial sector programs, residential weatherization programs, and development of the CAP and long-term funding mechanisms. In 2006, the program focus was expanded to include the under-served rental and multi-family housing sectors. This expansion was possible due to increased experiences and efficiencies in developing and managing programs, finalization of the CAP, and the addition of an Outreach Coordinator to manage marketing and education efforts.

This section will summarize the results of the 2006 programs. All of the listed programs are planned for continuation and expansion in 2007 with some modifications to incorporate 2006 results.

COMMERCIAL & INDUSTRIAL SECTOR PROGRAMS

The commercial and industrial sectors combine for 47% of Boulder's GHG emissions, which reflect higher energy use per property than residential units. Electricity use accounts for more than 50% of commercial emissions. Thus, it is critical that OEA work closely with both the commercial and industrial sectors to reduce their GHG emissions, while at the same time providing a supportive business environment. Any programs implemented for the commercial and industrial sectors will have significant impact on Boulder's emissions.

Building Performance with ENERGY STAR (BPwES)

BPwES is a commercial energy and water efficiency program run by OEA and the city's Water Conservation Office and offers free ENERGY STAR building benchmarking, energy audits, and customized technical assistance. The program is designed to help local businesses and contractors identify savings opportunities

and receive utility rebates for efficiency projects. This level of service is not offered by Xcel or any other entity in Boulder. The program's primary objectives are to increase efficiency in Boulder's commercial buildings, raise awareness of ENERGY STAR tools and utility rebates, and better understand the energy and water-related assistance needs of the commercial sector. Typically, participating businesses can reduce electricity and natural gas consumption by 20% and 15% respectively with a payback of less than four years if they implement the energy efficiency improvements of the audit.

In 2006, the program had a reduced budget due to the expiration of a grant and a smaller focus on water conservation. The reduced focus on water was a result of the lack of identified savings opportunities in the commercial properties evaluated in 2005. The BPwES program was administered by a local contractor, Nexant. Program participants were recruited through personal calls, newspaper articles and email announcements. To complement this program, staff worked with Xcel Energy to host an open house at the Chamber of Commerce to unveil and explain Xcel's new suite of efficiency rebates to local businesses, property managers, contractors and consultants. Staff actively engages the contractor community to connect them to resources and to encourage their clients to participate in city and utility programs.

ENERGY STAR Labeling

In 2005 and 2006, two buildings evaluated through the BPwES program received ENERGY STAR labels. To receive an ENERGY STAR certification, a building must achieve a specific energy rating that verifies it is more energy efficient than a majority of similar type facilities. It is notable that one of the buildings was built in 1909 while the other was built in 1975, demonstrating that even older buildings can be energy efficient. However, both of these buildings have owners that understand the financial implications of energy performance and have made on-going improvements to reduce costs and increase comfort.

● *RESULTS*

The results from the BPwES Program show good possibilities for improving the energy efficiency of existing commercial buildings. The most common recommendations discovered during these audits were upgrading of the lighting systems and recommissioning the heating and cooling systems. As shown in the table below, there are significant financial and energy efficiency opportunities.

RESULTS	2005	2006
Buildings Benchmarked	31	15
Buildings Audited	16	7
Potential Annual Energy Savings	$220,000	$17,888
Estimated Capital Investment	$800,000	$58,298
Average Payback (years)	3.84	3.42
Potential GHG reductions (mtCO2)	2,575	348
New ENERGY STAR labels	1	1

University of Colorado Graduate Projects

In 2006, OEA staff worked with University of Colorado graduate students who completed a project entitled "Market Barriers to Energy Efficiency in Commercial Buildings for the City of Boulder". This report details opportunities that other municipalities have used that might work in Boulder. Some of these opportunities include green leasing, strengthening the energy code, and an energy efficiency competition. The students also analyzed results from the BPwES program audits and offered suggestions for improving this program.

OEA also worked with a graduate student from the University of Colorado at Denver who studied Boulder's industrial sector and opportunities for energy efficiency. This report entitled "Recognition and Incentive policy options to promote reductions in greenhouse gas emissions from the industrial sector" analyzed four industrial facilities in Boulder and made a series of recommendations for work to improve energy efficiency. Both of these reports can be viewed at www.environmentalaffairs.com.

➤ *NEXT STEPS* – Commercial and Industrial Programs

The energy audits provide a valuable resource to the commercial sector. Due to cost and energy savings potential, this program will be expanded in 2007. However, one of the goals for this program in 2007 is to ensure that the energy audits translate to implementation of energy efficiency measures and green-house gas reductions. The energy audits only show the potential savings, and it is up to the facility owner to implement the suggested energy efficiency measures. OEA will develop stronger relationships with the business sector including energy service contractors to aid the implementation of the suggested energy improvements.

One method that OEA hopes to use to guide businesses to implement the suggested recommendations is the development of a program that is modeled after the Optimal Power Use Service (OPUS) Program offered by Silicon Valley Power. This program assists small businesses by providing energy audits and then assisting businesses to implement the recommendations of the audit by providing contractor resources, and project oversight.

Staff will also continue to follow up with the businesses served in 2005 and 2006 to collect data and pro-vide assistance where necessary. This will allow OEA to determine the actual energy efficiency improve-ments that have been completed as well as to determine what barriers may exist to implementing the suggestions from the audit reports.

In addition, OEA will offer trainings for contractors to both build awareness of energy efficiency efforts and also to build a trade ally network.

RESIDENTIAL SECTOR PROGRAMS

Weatherization Program

The city of Boulder contracted with Longs Peak Energy Conservation to offer free weatherization services to income-qualifying, owner-occupied households not served under the existing county-wide weatheriza-tion program. Sample measures include installation of compact fluorescent light bulbs (CFLs), additional insulation, programmable thermostats, duct sealing, furnace repair and replacement, and a combustion safety inspection. Under this program in 2006, ten homes and a child care center were retrofitted with a variety of energy efficiency measures, as compared to nine homes in 2005.

● *RESULTS*

This table summarizes the energy retrofits that were completed at the 10 properties through the city of Boulder's weatherization program in 2006.

ACTION	NUMBER OF HOMES
Attic insulation	3
Wall insulation	3
Foundation perimeter insulation	4
ENERGY STAR furnace upgrade	2
Misc health and safety repairs	5
Air/duct sealing	5
Compact fluorescent light bulbs	10
Energy audit and combustion system check	10

Insulation and Duct Sealing

While it is difficult to attach specific energy savings to certain weatherization improvements such as adding insulation, it is estimated that the average home uses approximately 50% of its energy load for heating and cooling. One of the most effective ways to reduce these energy loads is to have adequate insulation and sealed ducts to prevent heat loss in unconditioned spaces.

Furnaces

The furnaces replaced through the weatherization program were 60-65% efficient. The replacement furnaces are ENERGY STAR rated 90% efficient. This level of increased efficiency can save 15% per year in gas costs and over 20 years reduce GHG emissions by 13.6 mtCO2 .

CFLs

Over 120 CFLs were installed in the homes serviced through this project with numbers ranging from two to 32 per house. This energy efficiency measure saves 60,500 kWh over the life of the bulbs and prevents 47 mtCO2 from being released into the atmosphere assuming standard operating hours.

➤ *NEXT STEPS*

Due to lower-than-expected participation in the program, staff has evaluated the program's requirements, such as the income limit and owner-occupied restriction and will make adjustments in 2007 to expand the number of eligible households while maintaining a focus on lower-income residents. A possible explanation for the limited participation is that many of the income-qualified people or households may rent and not own their home, which would prevent them from participating under the current rules. In 2007, the goal for this program is to weatherize 20 homes in the city of Boulder, doubling the impact of the program in the community. Additionally, staff is exploring the possibility of acquiring energy history for the homes so a detailed follow–up after improvements are made can reveal actual energy savings for measures such as insulation and duct sealing.

Home Performance with ENERGY STAR (HPwES)

HPwES is a nationally-recognized program developed and supported by the ENERGY STAR program to build a market for whole-house retrofits. The aim of the program is to increase the energy efficiency, comfort, and durability of homes using a holistic approach that addresses the building envelope, heating and cooling systems, and appliances. In 2005, the city of Boulder partnered with the Fort Collins Utilities, E-Star Colorado, and ENERGY STAR to offer technical training on home energy analysis and systems-approach retrofits to three area contractors.

In 2006, the Boulder contractors qualified to perform HPwES audits and energy retrofits continued to seek on-going support for their new whole-house services for energy efficiency. The contractors began to market their home performance services with outreach support from the city of Boulder and E-Star Colorado.

● *RESULTS*

In the initial training, two Boulder based contractors sent a total of eight tradesmen to the HPwES training. These eight professionals are now equipped with knowledge and tools to conduct HPwES analysis in their existing work. Both contractors completed a mentoring phase which involved comprehensive audits at five homes using the ENERGY STAR tools and analysis techniques. They continue to incorporate this training knowledge in the post-mentoring phase of this program as they grow their businesses.

As energy efficiency continues to be a growing concern in the existing housing stock, the program will transform the market to a one-stop-shop approach for homeowners to hire contractors who are qualified to do full service, comprehensive retrofits. This market transformation is in collaboration with key partners in government agencies and utilities throughout the state. The city's involvement will be to financially support contractor training, outreach and education, and market transformation in our city, region and state.

➤ *NEXT STEPS*

Staff is currently working with E-Star Colorado to design a 2007 regional training including contractors from Fort Collins and Colorado Springs. The contractors targeted through this training will have established businesses and show potential for transforming their business model to embrace this comprehensive style of home performance evaluation and retrofits. Staff will work with E-Star to develop marketing materials and outreach ideas to spread brand recognition of this program throughout the community. Additionally, staff is considering developing other trainings through E-Star and a possible home energy makeover contest.

Multi-family Housing Energy and Water Assessment Program

In 2006, the city of Boulder launched a new multi-family housing program administered by the Brendle Group. OEA launched a program to focus on multi-family housing because approximately 55% of the city's residents live in multi-family housing units. The program targets the common areas of buildings

that are predominantly renter-occupied, represent a variety of neighborhoods and have not had major upgrades in the last ten years. The objectives of the pilot program are to increase the energy and water efficiency of multi-family housing and reduce utility costs for lower-income and under-served residents. The program also seeks to better understand the utility usage, savings potential, demographics, and needs of Boulder's multi-family housing stock. A possible outcome of this program is a recognition program that promotes energy efficient apartment buildings.

The program had a 2006 goal of providing free energy and water assessments to ten apartment buildings. However, the program was launched at the end of the University of Colorado's spring semester. This is a busy time for property managers and resulted in a limited response for the multi-family audits. Due to limited response, only four assessments were completed. Staff promoted this program through press releases, outreach to the Boulder County Rental Housing Association, and direct contact with property managers.

COMPLEX	NUMBER OF UNITS	POTENTIAL ANNUAL ELECTRICAL ENERGY SAVINGS (KWH)	POTENTIAL ANNUAL WATER SAVINGS (GAL)	POTENTIAL ANNUAL NATURAL GAS SAVINGS (THERMS)	POTENTIAL ANNUAL GHG EMISSION REDUCTIONS (MTCO2)	POTENTIAL ANNUAL COST SAVINGS	ESTIMATED CAPITAL COST	SIMPLE PAYBACK (YEARS)
Remington Post	278	56,120	1,052,400	6,930	203	$13,510	$15,260	1.1
Stratford Park	120	10,860	0	2,606	68	$2,430	$5,660	2.3
Coronado	124	26,840	1,693,000	3,350	98	$17,087	$34,960	2.1
Sunnyside Apts	8	2,400	101,000	780	20	$870	$3,310	3.8
TOTALS	**530**	**96,220**	**2,846,400**	**13,666**	**389**	**$33,897**	**$59,190**	**2.325**

➤ *NEXT STEPS*

This program will be expanded in 2007. While OEA did not complete the number of assessments originally planned, the four assessments provided good value to the multi-family units and the recommendations and assistance were well received by the property managers. OEA plans on both increasing our outreach efforts to ensure that this program succeeds in reaching more units in 2007 as well as expanding follow up assistance to help implement the recommendations.

Affordable Housing Collaboration

In December, OEA met with staff from many of the lower income housing agencies in the community. This included: Boulder Housing Partners, Thistle Community Housing, Habitat for Humanity, city of Boulder Housing and Human Services, and the Boulder County Housing Authority. This meeting allowed staff to discuss the current status of subsidized housing in regards to energy efficiency and how to work together in the future. This collaboration will continue in 2007 and will work towards bringing energy efficiency trainings to facility staff and tenants, increasing grant funding, and developing energy efficiency recommendations for existing properties and new development.

Boulder Energy Brigade

Inspired by direct install programs across the country, the city of Boulder partnered with Longs Peak Energy Conservation (LPEC), the University of Colorado Environmental Center and Boulder County senior tax workers to distribute energy and water efficiency kits to 550 households in two targeted neighborhoods on two separate Saturdays in July. Neighborhood residents were notified of the Brigade by direct mail and through press releases. The kits contained CFLs, water reduction aids, energy and water conservation information and a card offering the resident an opportunity to sign up for a free one hour energy audit. Upon delivery of the kits, residents were surveyed on their energy use habits. Residents that received one hour audits were also asked to fill out a survey which asked questions relating to making energy improvements. Staff also worked with Boulder Housing Partners to deliver a modified version of the kit to residents in their rental and public housing units.

● *RESULTS*

Kit distribution

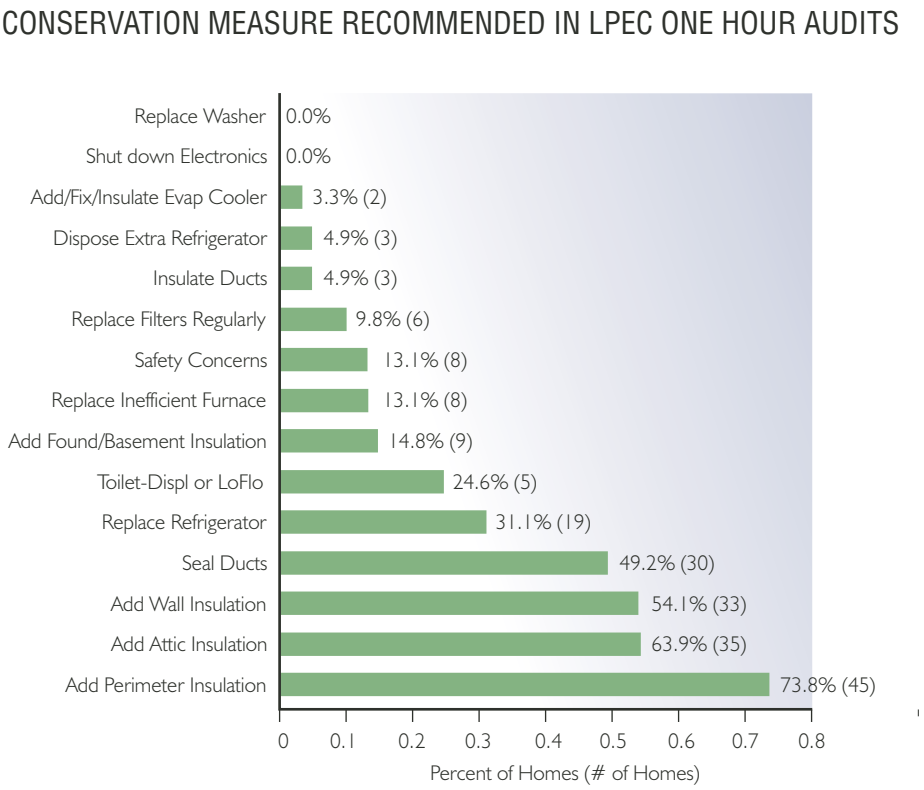
- 550 homes were visited; 300 kits were distributed (54% of residents were home to receive the kits)
- 81 kits were given away to delivery staff and walk-ins.
- 63 households in the two neighborhoods took advantage of the offer for free home energy audits (about 11%)
- 3,048 CFLs were distributed. Based on both the audit and kit evaluation results, recipients appear to have immediately used, on average, about 4.3 bulbs per household.
- 1,524,000 kWh savings in electricity use are expected over the life of the bulbs, assuming all bulbs distributed will be used.
- The equivalent GHG emissions reduction is 1,193 mtCO2.

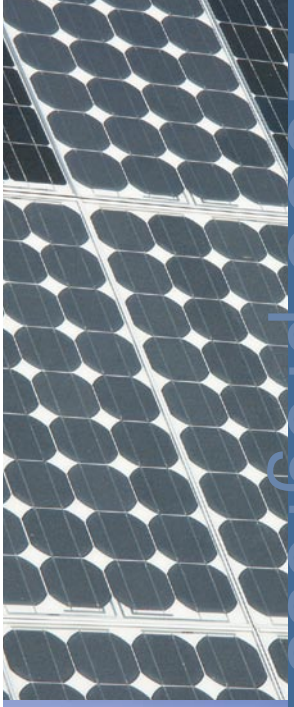
Survey of residents during kit delivery

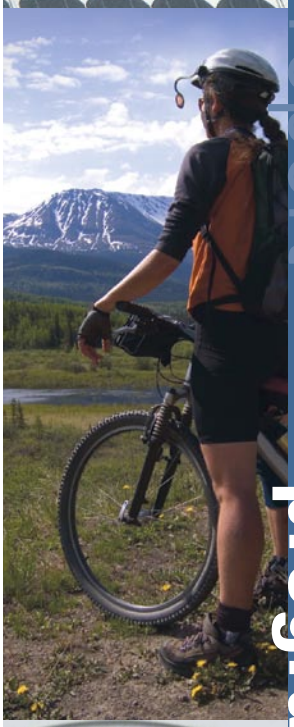
- 71% of the kits were delivered to homeowners rather than renters.
- When asked what motivated people to use less energy in their homes (other than cost), environment was mentioned 71% of the time.
- Residents were asked about specific changes they have made to conserve energy in the past five years. The most frequent responses were those that did not involve significant expenditures or home improvements, such as house temperature changes. 79% of survey participants have adjusted thermostats, while only 39% have added wall or ceiling insulation.
- 63% of the surveyed households reported using CFLs for lighting prior to the kit distribution, using an average of 5.6 bulbs per home. Some homes reported using CFLs for all their lights. 37% of the households reported they were not using any CFLs at the time of the survey.
- The partnership between CU students and senior tax workers to deliver the kits was largely successful; staff has received great feedback about this method for kit delivery.

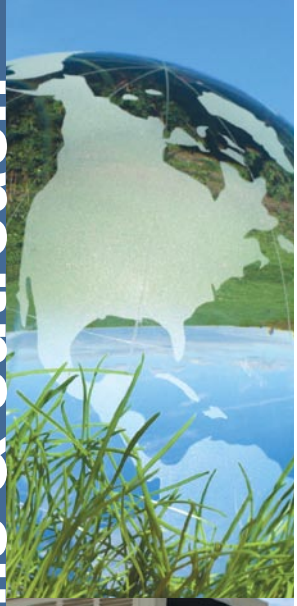
One-hour Audits

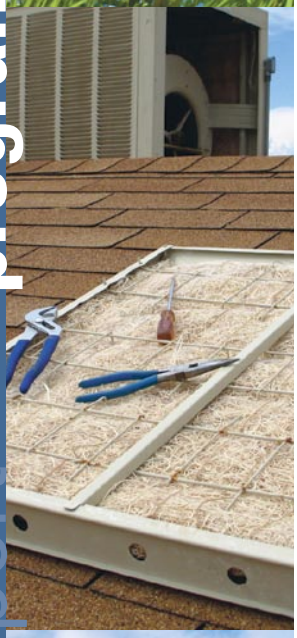
The chart below summarizes the one-hour audit recommendations:











Residents were asked about barriers to making energy improvements to their homes. Expense of implementation was the most common barrier to implementation, mentioned by 80% of audit recipients.

Boulder Housing Partners

- 300 kits were delivered to Boulder Housing Partners residents, 200 of these were available for pick-up at the main office, advertised through the resident newsletter. 100 kits were delivered to a selected location, Canyon Pointe, occupied mostly by senior citizens.
- Boulder County Housing Section 8 properties located in the city of Boulder received 100 kits
- If all the CFLs from the kits are installed, 800,000 kWh will be saved over the life of the bulbs and 626 mtCO2 will be not be emitted into the atmosphere.

➤ *NEXT STEPS*

Due to the success of this program, staff is currently designing the scope of the project for 2007. There are certain neighborhoods in Boulder where the housing stock is known to need energy efficiency improvements, such as insulation. These neighborhoods will likely be targeted in the 2007 Brigade. Staff is exploring the possibility of including a direct install component during the one-hour audits for measures such as CFLs, weather-stripping, or programmable thermostats to ensure that the energy savings will be realized. Staff will be partnering with CU again and hopes to expand portions of the program to include audit apprenticeships for students. Since insulation measures were the top recommendations from the audits and cost was the greatest barrier to residents completing upgrades, staff is exploring a new insulation program for 2007. The program could include a bulk insulation buy-down with local contractors with a partial subsidy from the city. Staff is also working with the Consortium of Cities to expand the Brigade to other communities in the county.

Residential Energy Audit Program

The Center for ReSource Conservation (CRC) partnered with the city of Boulder, Boulder County and Longmont Power and Communications to launch the Residential Energy Audit Pilot Program (REAP). The program provides low-cost, professional energy audits and energy conservation information to participating homeowners. The homeowners' cost is based on the home's conditioned square footage, ranging from $100 to $250. The city of Boulder and Boulder County each provide a $100 subsidy per audit for Boulder homes. Audits are provided by local energy service professionals and include a blower door test, insulation assessment, and appliance and HVAC system assessment. The homeowners receive a report with an analysis of their energy usage, a series of energy efficiency recommendations, and a list of qualified contractors who could perform the recommendations.

● *RESULTS*

In early 2006, 15 homeowners received energy audits through the pilot program. The most common finding by the auditors was the lack on insulation in these homes.

Due to the success of the pilot program, the Residential Energy Audit Program (REAP) was expanded beyond the pilot program in November, conducting 20 additional audits. The program plans on conducting a total of 458 audits in Boulder County by the end of 2007; 300 of those audits will be performed in the city of Boulder.

OUTREACH AND EDUCATION

Earth Day

As part of Boulder's membership in the US Mayor's Climate Protection Agreement, OEA was given a copy of HBO's documentary, Too Hot Not to Handle, produced by Laurie David, which was scheduled to premier on April 23rd, 2006. The documentary provides a guide to the effects of global warming in the United States. Staff partnered with a student group at the University of Colorado to co-host an Earth Day pre-screening of the documentary at the Boulder Theater on April 22nd, 2006. The event was free and open to the public. Over 375 community members attended the screening of the documentary.

Presentations and Information Dissemination

OEA's role in promoting a sustainable energy future in Boulder includes sharing information with the community about energy conservation and recommending actions that people can take in their lives to reduce their environmental impact. It is important for staff to attend local events, present information in the community, and organize workshops.

Some highlights of staff presentations and community events where staff have attended to distribute information about the city's energy programs, energy saving tips, and climate change include:

- Employees at the National Institute of Standards and Technology, Boulder
- Sierra Club, Indian Peaks Energy Chapter
- Members of a Lifestyles of Health and Sustainability (LOHAS) group from Japan
- New resident orientation at three Boulder Housing Partner's locations
- Boulder Jewish Community Center, screening of *An Inconvenient Truth*
- Boulder Book Store book signings: James Kunstler and Tim Flannery
- Center for Resource Conservation events: 5K Run and Solar Home Tour
- Collaboration with local Eco-Arts event
- Article in *Conservation Magazine* published by the Center for Resource Conservation

Public Process

In 2005, a Strategy Group was formed to draft broad recommendations for the focus of the city's GHG program. Participants were selected based on an expressed interest in the program, previous involvement with the program, policy knowledge in the field, the time and ability to serve, or by recommendation from other invitees. The members represented a variety of viewpoints and levels of knowledge about climate change and mitigation strategies.

In 2006, the Strategy Group was expanded, with a more specific focus and re-named the Climate Action Plan Committee. The Committee's role was to meet biweekly from January through June to provide input on the draft CAP and potential long term funding sources. All of the Strategy Group members chose to participate on the Committee in addition to several newly invited members. This group was instrumental in creating a CAP and a funding source that was both acceptable to Council and staff but also to all sectors of the community.

As part of the public process, staff presented the CAP and the funding options to various stakeholders in the community. These included:

- Public meeting at the Boulder Book Store
- Boulder Chamber of Commerce Board of Directors and Community Affairs Council
- Boulder Tomorrow
- Boulder industrial corporations
- League of Women Voters
- University of Colorado Leadership Series
- Leadership Boulder

Recognizing the benefits of citizen involvement, in 2007, staff will convene a technical advisory group to aid with the implementation of the CAP and guide staff in efforts to reach the GHG reduction goals.

ClimateSmart Campaign

Volunteers in the community led a successful campaign for Initiative 202, the Climate Action Plan tax called "Climate Smart: Doing Our Part". Many passionate, talented people in the Boulder community joined together to educate residents about the importance of passing the CAP tax. Staff met with some of the community members who organized the campaign following the election to get feedback about their

process and find out what aspects of the campaign were successful as well as where they felt resistance from the community.

Feedback from the Climate Smart Campaign organizers included:

- A campaign kit could be created and shared with other communities.
- Certain voters expressed concerns around the CAP not being strong enough to meet the goal.
- Implementation ideas include: neighborhood competitions and events, a "Big Splash" campaign, addressing social benefits to lower income residents, and promotion and recognition for residents and businesses that are doing their part.
- An important message that the CAP should communicate is that the city serves as a facilitator to leverage investment in the community.

Branding the Climate Action Plan

Staff began a process with a local marketing firm to create a brand for the CAP efforts and programs. This effort involved focus groups and surveying a variety of community members on different brands and campaign ideas. One of the names that was discussed through the initial branding process was "ClimateSmart". The city would like to keep the name "ClimateSmart" until the branding discussion is complete. The city issued an RFP for a marketing firm to continue the branding process for the CAP in January 2007.

Boulder Wind Challenge

The city of Boulder, in partnership with Western Resource Advocates (WRA) and local renewable energy suppliers, launched the second annual Wind Challenge in early October. New partners included Longmont Power and Communications and Native Energy, based in Vermont. Boulder County and other communities within the County have partnered to join the Wind Challenge this year. The challenge set the goal of signing up 1,500 new wind power customers throughout Boulder County by November 30th. Due to lower than anticipated participation rates, the Challenge was extended through January 30, 2007.

As of December 31, 2006, there were over 400 new wind power subscribers in Boulder County, subscribing to approximately 2,065,393 kWh of wind energy per year. This is equivalent to a reduction of 1,617 mtCO2. Of the new subscribers through the end of the year, 313 were in the city of Boulder, subscribing to 1,145,000 kWh of wind energy per year, equivalent to a reduction of 897 mtCO2.

Outreach for the Wind Challenge was conducted through various avenues such as tabling during energy awareness month, ads in the *Daily Camera*, press releases, radio announcements, and a message on the city of Boulder water bill. Staff spent a lot of time educating residents one-on-one about what it means to buy wind energy and the benefits that the community realizes through these purchases.

➤ *NEXT STEPS*

The Wind Challenge is a great avenue for staff to educate the public about wind energy and Renewable Energy Credits (RECs). Through this process, staff recognized the confusion that exists about RECs and carbon offsets in the marketplace. Staff has identified that it would be beneficial to develop an educational program to help elucidate some of the questions and concerns that arise around these purchases. In 2007, staff will continue to research the various options for buying RECs and offsets and compile an educational resource for residents that define the options that exist in the marketplace.

OCTOBER ENERGY AWARENESS MONTH

Compact Fluorescent Light Bulb Giveaway

Staff continued the 2005 CFL giveaway program in 2006. Most of the bulbs were handed out during October's Energy Awareness Month in conjunction with ENERGY STAR's sixth annual "Change a Light, Change the World" campaign. Staff set up tables around town throughout the month of October at locations such as the Center for Resource Conservation's Solar Green Home tour, the Pearl Street Mall, King Soopers in South Boulder, Whole Foods Market, and the main Boulder Public Library. The public

was notified through press releases, the greenhouse gas e-newsletter, and ads placed in the *Daily Camera*. Staff used the tables as opportunities to hand out light bulbs, energy saving tips and information, and to promote the Boulder Wind Challenge.

Staff also distributed light bulbs throughout the fall through a variety of other venues such as CU classes, Boulder Housing Partner resident orientations, Thorne Ecological Institute community event, and the Boulder Farmer's Market.

● RESULTS

TOTAL NUMBER OF BULBS DISTRIBUTED	KILOWATT HOURS OF ENERGY SAVED*	EQUIVALENT GREENHOUSE GAS REDUCTION
1,578	850,800	666 metric tons of CO2

** Savings are over the lifetime of the bulb and assuming the CFL was replacing a standard incandescent bulb of equivalent lumens and average CFL life is 10,000 hours.*

➤ NEXT STEPS

Staff has visited with Fort Collins Utilities and their lighting program coordinator. Fort Collins uses a model which supports expanding the presence of CFLs in the marketplace. The program is structured around working with local retailers to set up marketing displays and offering coupons and discounts to consumers to buy CFLs. Fort Collins Utilities subsidizes the coupons and works closely with the retailers to support the program. Staff is exploring a similar model for 2007's CFL program, promoting a market transformation and the possibility of partnering with other groups in the region, such as Platte River Power Authority.

October 4th declared Change a Light Day

As part of Energy Star's October Energy Awareness campaign, cities were invited to declare October 4th as ENERGY STAR Change a Light Day and residents were asked to take a pledge to change an incandescent light bulb to an ENERGY STAR compact fluorescent. On October 3rd, Mayor Mark Ruzzin declared October 4th as ENERGY STAR Change a Light Day in Boulder. Staff gave away CFLs and information on ENERGY STAR products at Whole Foods Market in honor of Change a Light Day. If every resident in Boulder changes one incandescent bulb to an ENERGY STAR CFL, a combined total of 26,697,786 kWh of energy would be saved and 35,235 mtCO2 emissions would be prevented from being released into the atmosphere over the life of the bulb.

University of Colorado class study – Compact Fluorescents

An Energy Technology and Policy graduate class at the University of Colorado analyzed CFL efficiency and cost savings. Staff provided each student in the class with a 15 watt CFL, equivalent to a 60 watt incandescent. The students installed the bulbs (32 total) and recorded savings data based on actual usage factoring in energy prices, time of use, lifetime of the bulb, and the watts saved. The students reported aspects such as annual electricity savings, carbon savings, and the price the carbon credits would be worth if they were sold in a U.S. carbon market.

● RESULTS

METRIC	RESULT
Annual electricity savings	2034 kWh
Annual $ saving (assume $.08/kWh)	$163
Payback (assume first cost $1.80)	0.35 years
Total electricity savings (assume CFL lasts 8,000 hours)	10,760 kWh
Total CO2 reduction (assume carbon intenstiy 1.8 pounds CO2/kWh)	9 mtCO2
Value of carbon on European Carbon Market (assume 1.3 $/Euro, 13 Euros/tonne)	$148
Value of carbon on U.S. Carbon Market (assume $4/tonne)	$35

CITY OPERATIONS & POLICIES

The city organization is committed to working towards environmental sustainability. While staff have made great strides in helping the community reduce GHG emissions, it is also critical that the city look at its own operations to lead the way and serve as a model for the community.

In 2005, the city organization used over 25 million kilowatt hours of electricity and 600,000 therms of natural gas, emitting over 30,000 mtCO2. The city's fleet annually emits almost 3,000 mtCO2. The sharp rise in electricity and fuel prices continues to strain already limited city budgets.

The city departments actively respond to suggestions for improving its policies in ways that support the GHG goal and other city goals. For example, in 2006, OEA collaborated with Planning and Development Services, Historic Preservation and an ad-hoc panel of professionals to resolve inconsistencies between the Green Points Program and Historic Preservation guidelines in a way that allows for greater energy efficiency, while preserving historic integrity of buildings. OEA also worked with the Division of Housing and Boulder Housing Partners to explore policy solutions that encourage affordable housing homeowners to improve the energy efficiency of their homes and to consider renewable energy systems.

FACILITIES AND ASSET MANAGEMENT (FAM)

The Facilities and Asset Management (FAM) Division is continuously evaluating strategies, such as conservation, energy efficiency, and renewable energy, to meet the energy needs of the city organization at the lowest cost. It is FAM's general policy to complete energy-saving projects that have a five year or less payback.

In 2006, FAM completed over $360,000 worth of energy efficiency improvements in city facilities. These improvements included replacement of old HVAC units with newer more efficient units, additional insulation, and window replacement. FAM is actively pursuing methods to reduce energy costs as many departments are struggling to meet the increasing costs of energy.

The city also continues with wind power purchases, bringing renewable energy to 3% of the city's total electrical load.

In 2007, the city will continue its aggressive actions to reduce emissions at city facilities and through city operations. FAM will conduct energy audits at a number of city facilities to help us identify areas of potential cost savings and GHG emission reductions. These audits will help the city develop a strategy to ensure city buildings can serve as a model for the community.

In addition, we will continue to evaluate the feasibility of solar on city facilities and also the possibility of increasing wind power purchases.

FLEET SERVICES

Fleet Services has also been active in trying to reduce GHG emissions through the use of city fleet vehicles. In 2006, Fleet Services purchased 41 vehicles. In 14 of these cases no alternative fuel or hybrid vehicle was available from the manufacturer that would meet the city's specifications. Of the remaining 27 new vehicles, the city purchased 21 that were alternative fuel or hybrid vehicles. Specifically, the city purchased 13 flexible fuel vehicles that can use ethanol (E85), seven diesel vehicles that can use biodiesel (B20), and one Ford Escape Hybrid. Overall, the city purchased an alternative fuel or hybrid vehicle 78% of the time when one was available and 51% of the time overall. E85 and B20 are available at the city fuel yard and staff has worked with fuel retailers to manage costs to departments.

GREEN POINTS PROGRAM GUIDELINES REVISION

The Green Points Program is the residential building ordinance designed to minimize the short and long term environmental impacts of new and remodeled homes, including energy consumption. In order to receive a building permit and pass inspection, a builder must demonstrate how they will earn the requisite number of "green points," as defined in the guidelines. The program is currently being updated, assess-

ing new alternative technologies, methods and products. Program updates also include assessing how the program is administered and used by its permit applicants. A few update goals are to make energy performance a pertinent component of the requirements and making certain "green" measures mandatory to enhance the program's contribution to citywide sustainability goals.

HISTORIC PRESERVATION – WINDOWS AND ENERGY EFFICIENCY

There are numerous houses and buildings in the city of Boulder that hold historical significance due to their age and architectural design. The city has made great efforts to protect these historical buildings with the enactment of laws to maintain the original structures as well as with the establishment of the Landmarks Preservation Advisory Board. However, efforts to protect the historical integrity of buildings can conflict with new building techniques to make buildings more energy efficient. A compromise to alleviate this conflict was reached where some windows could be replaced for more energy efficient ones while the windows facing the street should remain historical.

SOLAR REBATE

City Council directed staff to prepare an ordinance providing for a sales and use tax rebate on qualified photovoltaic (PV) or solar thermal (hot water) systems installed within the city. City Council also directed that a portion of the sales and use tax be dedicated to rehabilitation or installation of renewable energy systems – especially focusing on low or moderate-income housing and site-based non-profit organizations. On November 14th, the ordinance was passed by City Council. City of Boulder sales and use tax paid on systems after December 14th will be eligible for this rebate. Of the total tax eligible for rebate, 35% can be rebated to the taxpayer and 65% will be dedicated to a renewable energy fund. Staff is working with local stakeholders to develop criteria and a plan for investing the renewable energy account funds to best meet the city and community needs. OEA, with the collaboration of Planning and Development Services, and Finance, will be processing rebate applications and providing information to the community about the rebate.

CHICAGO CLIMATE EXCHANGE (CCX)

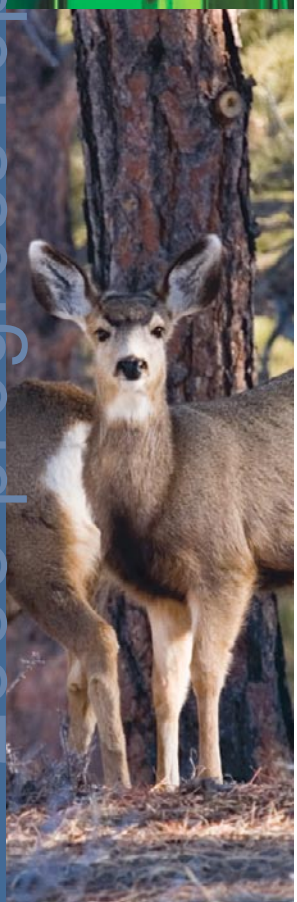
In 2006, the city organization continued its membership in the Chicago Climate Exchange (CCX). CCX is a voluntary, legally binding cap and trade pilot program designed to reduce GHG emissions, help businesses and organizations manage emissions and recognize the value of reductions, and implement market-based strategies for emissions reduction. For municipal members, only organization-wide emissions from electricity, natural gas, and fleet fuel are included; community-wide emissions are excluded.

CCX accepted the city of Boulder's emissions reports for the baseline, 2003, 2004 and 2005. According to the 2005 audited emissions report, the city organization reduced its emissions from vehicle fuel and natural gas by 34% relative to the baseline. Emissions from electricity decreased 11%. As a result of total lower emissions in 2003 through 2005 as compared to the baseline, the city of Boulder has 83 carbon financial instruments (CFI's), representing 8,300 mtCO2 that can be banked or sold. As of December 30, 2006, CFI's are traded at approximately $4 each.

The city of Boulder formally agreed to participate in the next phase covering 2007-2010. There will be no participation fees for the city. Participation commits the city to an additional 2% reduction in emissions below the baseline for a total reduction of 6% below baseline by 2010.

ENERGY FREEDOM CHALLENGE

The city of Boulder joined the Energy Freedom Challenge (EFC) as a founding city in 2006. The EFC is a national competition to encourage U.S. cities to achieve energy independence by meeting over half of their city's electricity needs using clean, renewable, domestically-produced resources such as wind, solar and bioenergy. The winning city will be designated the "Clean Energy Capital of the U.S." A major objective of the EFC is to educate the public about renewable energy and provide a road map to encourage communities to go further and faster toward the goal of energy independence.



Currently, renewable energy accounts for approximately 3% of the city's total electrical load. The city currently purchases 420,000 kWh a year of wind power from Xcel Energy. The North Boulder Recreation Center purchases 377,000 kWh of wind through renewable energy certificates (REC). These purchases reduce our greenhouse gases by 624 mtCO2.

TRANSPORTATION

Emissions from vehicles continue to be a large source of GHG emissions in Boulder, contributing 27% to total emissions. From 2004 to 2005, transportation sector emissions decreased by 2.4%. This resulted primarily from a 30% increase in the amount of ethanol and biodiesel used. Part of this increase is likely due to improved tracking and reporting, but there were real increases in ethanol and biodiesel use. Because Council did not authorize budget or staff to work on transportation-related GHG issues for 2005-2006, progress in this sector has been limited. Staff has initiated discussions with the Transportation Division and alternative transportation groups to collaborate and form synergies between the departments and programs. The CAP and tax includes a new position and budget to address this sector. In early 2007, OEA will hire a full time, fixed term employee to work on transportation emission reduction strategies and programs.

WASTE REDUCTION

Emissions from the solid waste sector, in the form of landfill gas or methane, represent 4% of total emissions. The City Council, as part of the 2000 budget process, established a 50% waste diversion goal, to be achieved by 2005. Although Boulder did not reach 50% waste diversion by the end of 2005, research conducted as part of the master planning process indicated that the current funding levels and expansion of pilot programs should bring the city's diversion rate to 60 percent by the end of 2007. City Council approved the Master Plan for Waste Reduction and also passed a Zero Waste resolution in 2006.

In 2006, the city expanded a residential organics program called the "Can, Can, Can Program" to approximately 2,400 households with city-wide implementation scheduled for 2007. It is designed to increase waste diversion from the residential sector. This program is an important first step to decreasing the amount of food waste and yard debris sent to the landfill and increasing compost. On average, pilot participants were able to recycle or compost 70% of their household waste. This is a 21% increase over typical households.

OEA also supported a commercial composting program to collect food waste from restaurants and grocery stores. The city provides businesses with a rebate of $2.50 per yard of organic waste collection subscription. The goal of the rebate is to increase organic waste collection in the commercial sector and to offset some of the additional costs to the business for organic waste collection. In 2006, 51 businesses participated, compared to ten in 2005. This program diverted approximately 600 tons of material from the landfill in 2006.

URBAN FORESTRY

While the sequestration benefits of Boulder's urban forest are currently not included in the emissions inventory, staff recognizes the environmental benefits of trees and supports the Urban Forestry program. It is estimated that Boulder's trees store an estimated 109,000 metric tons of carbon and sequester about 1,900 tons annually. In 2006, the city planted 160 trees with approximately 120 planted along city streets and the remaining in city parks. The Urban Forestry program also receives donations to plant additional trees. Staff will continue to work with the Urban Forestry department and other cities and organizations to explore the possibility of accounting for the carbon sequestration benefits of the urban forest in the community's GHG inventory. Currently, there is no widely accepted or commonly practiced methodology for estimating benefits from urban forests for community GHG inventories.

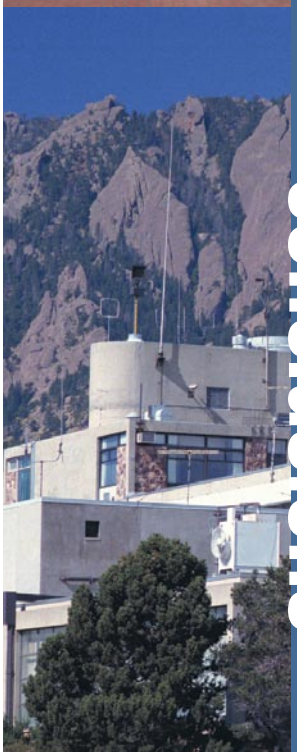
Additionally, OEA collaborated with the Urban Forestry program and Housing and Human Services to offer free trees to city residents living in affordable housing. This program was announced late 2006 and the trees will be available to residents for pick up in the spring of 2007. These trees will not only help in the sequestration of carbon, but will also help provide shade reducing the need for air conditioning in the summer months.

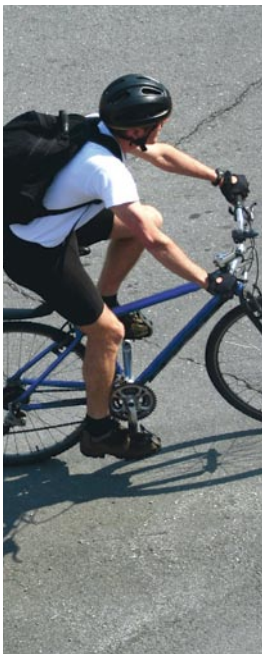
CONCLUSIONS

The activities completed in 2006, including Wind Challenge subscribers, CFL installations, and weatherization work, will result in direct GHG emissions reductions of over 8,000 mtCO2 over the life of the equipment. It is anticipated that significant energy savings will result from the audit programs, as both residential and commercial facilities implement some of the recommended measures. Additionally, while the direct impacts of education and outreach are difficult to quantify, increased public awareness of energy- and climate change-related issues will likely lead to increased voluntary actions to conserve energy and reduce GHG emissions. The 2006 reductions represent a small reduction in the context of the larger goal; however, it represents over a ten-fold increase in emissions reductions over 2004 city activities. Through its website, public presentations, outreach, and programs, the city is establishing itself as an important and reliable community resource.

The programs, activities and policies established in 2004 through 2006 formed the foundation for practical, effective and more aggressive action to reduce emissions. 2007 will represent the first year in which funding for the city's climate protection efforts will be aligned with the comprehensive actions and programs necessary to make significant progress in reducing emissions. Though the carbon tax is not active until April, staff will have access to its complete, requested budget beginning in January. The lessons learned in previous years will be applied to future programs to ensure that Boulder's residents and businesses receive a high level of service and that city funds are spent wisely. Staff will continue to engage members of the community on suggestions for improving programs and developing new strategies. Staff will also seek out new partners, such as other cities, counties and non-profit organizations, to leverage resources and share best practices.

CITY OF BOULDER

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